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Instructor: Bill Clayton, CBO



- Builder/designer 15+ years
- 31+ years of Code Administration and enforcement experience
- ICC/IBC General Committee 2015 cycle
- ICC/IEBC Committee 2009 & 2012 cycle
- Code Consultant, Inspector, Plans Examiner, Instructor with CCC/Shums Coda 8+ Years
- RCBO!
- 22 ICBO, ICC, & FEMA IS 100, 200, 700, 800 Certifications
- State of Colorado 3rd party School inspector
- State of California Emergency Safety Assessment Inspector

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Class Overview

- Advanced Look at the Design & Review of Means of Egress
- Unusual Conditions
 - High-Rise Buildings
 - Smokeproof Enclosures
- Special Occupancies
 - Assembly Occupancies
- Examples



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Past Experience

- **Cocoanut Grove**
 - November 28, 1942
 - 492 fatalities
 - Maze of rooms and passageways
 - Blocked and locked exit doors
 - No emergency lighting
 - Swing of doors against egress path
- **Beverly Hills Supper Club Fire**
 - May 28, 1977
 - 164 Fatalities
 - Maintenance of egress
 - Concealed, combustible spaces
 - Overcrowding
 - Double the calculated occupant load
 - Egress capacity not adequate
 - Interior Finishes

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Past experience

- **MGM Fire**
 - November 21, 1980
 - 85 fatalities, 700 injured
 - Stairwell filled with smoke
- **Station Fire**
 - February 20, 2003
 - 100 fatalities
 - Interior finishes
 - High spread of fire



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ICC PERFORMANCE CODE



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MEANS OF EGRESS 701



- **701.1 Objective.**
 - To protect people during egress and rescue operations.
- **701.2 Functional statement.**
 - Enable occupants to exit the building, facility and premise or reach a safe place as appropriate to the design performance level determined in Chapter 3.

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Objective 1901.1

- To protect people during egress and rescue operations.



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Functional Statement 1901.2



- Enable occupants to exit the building, facility and premises or reach a safe place as appropriate to the design performance level determined in Chapter 3.

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Performance Requirements 1901.3.1

- The construction, arrangement and number of means of egress, exits and safe places for buildings shall be appropriate to the travel distance, number of occupants, occupant characteristics, building height, and safety systems and features.



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Identification, Illumination And Safety Of Means Of Egress - 1901.3.2

- Means of egress shall be clearly identified, provided with adequate illumination and be easy and safe to use.



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Unobstructed Path 1901.3.3

- Means of egress shall provide an unobstructed path of travel from each safe place to not less than one exit.



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Protection From Untenable Conditions - 1901.3.4



- Each safe place shall provide adequate protection from untenable conditions, an appropriate communication system, and adequate space for the intended occupants.

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Human Biomechanics And Expectation Of Consistency 1901.3.5

- Means of egress shall enable reasonable use by the occupants in the building with due regard to human biomechanics and expectation of consistency.



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Maintenance Of Means-of-egress Systems - 1901.3.6



- Suitable means of egress shall be provided in satisfactory arrangement throughout all buildings, facilities and premises, regardless of when they were constructed, based upon the number and character of occupants, length of travel, provision of existing alternative paths, time line of emergency detection and response, risk level, time to exit, and safety systems provided.

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Maintenance Of Clear Path 1901.3.7



- Means of egress shall be maintained without obstructions or reductions in capacity that would hinder the ability of the occupants to egress safely.

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Interference With Identification Of Exits - 1901.3.8

- Means of egress shall be readily identifiable. Buildings shall be operated and maintained in a manner that does not interfere with the identification of exits.



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Ease Of Use 1901.3.9

- Means of egress shall be maintained and operated in such a manner to ensure that all egress facilities are readily openable and available without special knowledge or effort consistent with the use or occupancy characteristics.



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Maintenance Of Illumination 1901.3.10

- Means of egress shall be maintained and operated in such a manner to ensure that adequate lighting to facilitate safe egress is available.



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Means of Egress Philosophy

- A safe means to allow the occupant of a building to egress the building in a safe, timely and orderly manner.



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Means of Egress Philosophy



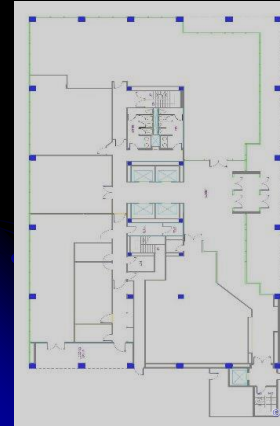
- Give the occupants alternative paths of travel to a place of safety to avoid fire
- Shelter occupants from fire and smoke
- Accommodate all occupants of the structure
- Provide a clear, unobstructed, well marked and illuminated path under the control of the user without special tools, effort, knowledge or keys

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A Quick Review



- Means of Egress Definition
 - From any occupied portion of building to the public way
- Three Parts of the Means of Egress
 - Exit Access
 - From any occupied point to the exit
 - Exit
 - Protected portion of Means of Egress
 - Exit Discharge
 - From the exit to the public way

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Means of Egress Design

- Determine Occupant Load
 - Floor Area/Occupant Load Factor (Table 1004.5)

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR
Accessory storage areas, mechanical equipment room	300 gross
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal	
Baggage claim	20 gross
Baggage handling	300 gross
Concourse	100 gross
Waiting areas	15 gross
Assembly	
Gaming floors (keno, slots, etc.)	11 gross
Exhibit gallery and museum	30 net
Assembly with fixed seats	See Section 1004.6
Assembly without fixed seats	
Concentrated (chairs only—not fixed)	7 net
Standing space	5 net
Unconcentrated (tables and chairs)	15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas	150 gross
Concentrated business use areas	See Section 1004.8

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Means of Egress Design

- Determine number of exit access doorways or exits
 - Occupant load
 - Common path of egress travel

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Sprinkler System (feet)		With Sprinkler System (feet)
		Occupant Load		
		OL ≤ 30	OL > 30	
A, E, M	49	75	75	75*
B	49	100	75	100*
F	49	75	75	100*
H-1, H-2, H-3	3	NP	NP	25*
H-4, H-5	10	NP	NP	75*
I-1, I-2*, I-4	10	NP	NP	75*
I-3	10	NP	NP	100*
R-1	10	NP	NP	75*
R-2	20	NP	NP	125*
R-3	20	NP	NP	125*†
R-4	20	NP	NP	125*†
S	29	100	75	100*
U	49	100	75	75*

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Means of Egress Design

- Determine Egress Widths
 - Occupant Load/Egress Width Factor



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Exit Access Components

- Aisles
- Corridors
- Egress Balconies



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Means of Egress Components

- Doors
- Gates
- Stairways
- Ramps



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1010.2.11 - Door hardware release of electrically locked egress doors

- Door hardware release of electric locking systems shall be permitted on doors in the means of egress in any occupancy except Group H where installed and operated in accordance with all of the following:



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1010.2.11 - Door hardware release of electrically locked egress doors

1. The door hardware that is affixed to the door leaf has an obvious method of operation that is readily operated under all lighting conditions.
2. The door hardware is capable of being operated with one hand and shall comply with Section 1010.2.1.
3. Operation of the door hardware directly interrupts the power to the electric lock and unlocks the door immediately.
4. Loss of power to the electric locking system automatically unlocks the door.
5. Where panic or fire exit hardware is required by Section 1010.2.9, operation of the panic or fire exit hardware also releases the electric lock.
6. The locking system units shall be listed in accordance with UL 294.

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1010.2.12 - Sensor release of electrically locked egress doors

- Sensor release of electric locking systems shall be permitted on doors located in the means of egress in any occupancy except Group H where installed and operated in accordance with all of the following criteria:



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1010.2.12 - Sensor release of electrically locked egress doors

1. The sensor shall be installed on the egress side, arranged to detect an occupant approaching the doors, and shall cause the electric locking system to unlock.
2. The electric locks shall be arranged to unlock by a signal from or loss of power to the sensor.
3. Loss of power to the lock or locking system shall automatically unlock the electric locks.



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1010.2.12 - Sensor release of electrically locked egress doors

4. The doors shall be arranged to unlock from a manual unlocking device located 40 inches to 48 inches vertically above the floor and within 5 feet of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads "PUSH TO EXIT." When operated, the manual unlocking device shall result in direct interruption of power to the lock - independent of the other electronics - and the electric lock shall remain unlocked for not less than 30 seconds.



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1010.2.12 - Sensor release of electrically locked egress doors

5. Activation of the building fire alarm system, where provided, shall automatically unlock the electric lock, and the electric lock shall remain unlocked until the fire alarm system has been reset.
6. Activation of the building automatic sprinkler or fire detection system, if provided, shall automatically unlock the electric lock. The electric lock shall remain unlocked until the fire alarm system has been reset.



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1010.2.12 - Sensor release of electrically locked egress doors

7. Emergency lighting shall be provided on the egress side of the door.
8. The door locking system units shall be listed in accordance with UL 294.



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Delayed Egress 1010.2.13

- Delayed egress locking systems shall be permitted to be installed on doors serving the following occupancies in buildings that are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or an approved automatic smoke or heat detection system installed in accordance with Section 907.
 1. Group B, F, I, M, R, S and U occupancies.
 2. Group E classrooms with an occupant load of less than 50.



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Delayed Egress 1010.2.13.1

Exception:

- In courtrooms in Group A-3 and B occupancies, delayed egress locking systems shall be permitted to be installed on exit or exit access doors, other than the main exit or exit access door, in buildings that are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.



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1010.2.13.1

Delayed egress locking system

- The delayed egress locking system shall be installed and operated in accordance with all of the following:



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1010.2.13.1

Delayed egress locking system

- The delay electronics of the delayed egress locking system shall deactivate upon actuation of the automatic sprinkler system or automatic fire detection system, allowing immediate, free egress.
- The delay electronics of the delayed egress locking system shall deactivate upon loss of power controlling the lock or lock mechanism, allowing immediate free egress.
- The delayed egress locking system shall have the capability of being deactivated at the fire command center and other approved locations.



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1010.2.13.1

Delayed egress locking system

- An attempt to egress shall initiate an irreversible process that shall allow such egress in not more than 15 seconds when a physical effort to exit is applied to the egress side door hardware for not more than 3 seconds. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the delay electronics have been deactivated, rearming the delay electronics shall be by manual means only.

Exception: Where approved, a delay of not more than 30 seconds is permitted on a delayed egress door.



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Delayed egress locking system

- The egress path from any point shall not pass through more than one delayed egress locking system.
- Two Exceptions



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1010.2.13.1

Delayed egress locking system

Exception:

- 1. In Group I-1, Condition 2, Group I-2 or I-3 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided the combined delay does not exceed 30 seconds.



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1010.2.13.1

Delayed egress locking system

- 2. In Group I-1, Condition 1 or I-4 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided the combined delay does not exceed 30 seconds and the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.



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1010.2.13.1

Delayed egress locking system

6. A sign shall be provided on the door and shall be located above and within 12 inches of the door exit hardware:
 1. For doors that swing in the direction of egress, the sign shall read: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.
 2. For doors that swing in the opposite direction of egress, the sign shall read: PULL UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.
 3. The sign shall comply with the visual character requirements in ICC A117.1.



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1010.2.13.1

Delayed egress locking system

7. Emergency lighting shall be provided on the egress side of the door.
8. The delayed egress locking system units shall be listed in accordance with UL 294.



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Controlled egress doors in Groups I-1 and I-2 - 1010.2.14



- Electric locking systems, including electro-mechanical locking systems and electromagnetic locking systems, shall be permitted to be locked in the means of egress in Group I-1 or I-2 occupancies where the clinical needs of persons receiving care require their containment.
- Controlled egress doors shall be permitted in such occupancies where the building is equipped throughout with an automatic sprinkler system or an approved automatic smoke or heat detection system, provided that the doors are installed and operate in accordance with all of the following:

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Controlled egress doors in Groups I-1 and I-2 - 1010.2.14

1. The doors unlock upon actuation of the automatic sprinkler system or automatic smoke detection system.
2. The doors unlock upon loss of power controlling the lock or lock mechanism.
3. The door locks shall have the capability of being unlocked by a signal from the fire command center, a nursing station or other approved location. The switch shall directly break power to the lock.
4. A building occupant shall not be required to pass through more than one door equipped with a special egress lock before entering an exit.
5. The procedures for the operation(s) of the unlocking system shall be described and approved as part of the emergency planning and preparedness required by Chapter 4 of the IFC.
6. All clinical staff shall have the keys, codes or other means necessary to operate the locking devices.
7. Emergency lighting shall be provided at the door.
8. The door locking system units shall be listed in accordance with UL 294.

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Controlled egress doors in Groups I-1 and I-2 - 1010.2.14

- Exceptions:
 1. Items 1 through 4 shall not apply to doors to areas occupied by persons who, because of clinical needs, require restraint or containment as part of the function of a psychiatric treatment area.
 2. Items 1 through 4 shall not apply to doors to areas where a listed egress control system is utilized to reduce the risk of child abduction from nursery and obstetric areas of a Group I-2 hospital.



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Revolving Doors 1010.3.1

- Revolving doors shall comply with the following:
 1. Revolving doors shall comply with BHMA A156.27 and shall be installed in accordance with the manufacturer's instructions.
 2. Each revolving door shall be capable of breakout in accordance with BHMA A156.27 and shall provide an aggregate width of not less than 36 inches.
 3. A revolving door shall not be located within 10 feet of the foot of or top of stairs or escalators. A dispersal area shall be provided between the stairs or escalators and the revolving doors.



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Revolving Doors 1010.3.1



4. The revolutions per minute (rpm) for a revolving door shall not exceed the maximum rpm as specified in BHMA A156.27. Manual revolving doors shall comply with Table 1010.3.1(1). Automatic or power-operated revolving doors shall comply with Table 1010.3.1(2).
5. An emergency stop switch shall be provided near each entry point of power or automatic operated revolving doors within 48 inches of the door and between 34 inches and 48 inches above the floor. The activation area of the emergency stop switch button shall be not less than 1 inch (25 mm) in diameter and shall be red.

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Revolving Door Speeds Table 1010.3.1(1)

REVOLVING DOOR MAXIMUM NOMINAL DIAMETER (FT-IN)	MAXIMUM ALLOWABLE REVOLVING DOOR SPEED (RPM)
6-0	12
7-0	11
8-0	10
9-0	9
10-0	8

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Table 1010.3.1(2)

REVOLVING DOOR MAXIMUM NOMINAL DIAMETER (FT-IN)	MAXIMUM ALLOWABLE REVOLVING DOOR SPEED (RPM)
8-0	7.2
9-0	6.4
10-0	5.7
11-0	5.2
12-0	4.8
12-6	4.6
14-0	4.1
16-0	3.6
17-0	3.4
18-0	3.2
20-0	2.9
24-0	2.4

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Revolving Doors 1010.3.1

6. Each revolving door shall have a side-hinged swinging door that complies with Section 1010.1 in the same wall and within 10 feet of the revolving door.
7. Revolving doors shall not be part of an accessible route required by Section 1009 and Chapter 11.



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Egress Component 1010.3.1.1

- Shall comply with Section 1010.3.1 and:
 1. Revolving doors shall not be given credit for more than 50 percent of the required egress capacity.
 2. Each revolving door shall be credited with no more than a 50-person capacity.
 3. Each revolving door shall provide for egress in accordance with BHMA A156.27 with a breakout force of not more than 130 pounds



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Other Than Egress Component 1010.3.1.2

- A revolving door used as other than a component of a means of egress shall comply with Section 1010.3.1.
- The breakout force of a revolving door not used as a component of a means of egress shall not be more than 180 pounds



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1010.1.3.2 Exception

- Exception: A breakout force in excess of 180 pounds is permitted if the breakout force is reduced to not more than 130 pounds when not less than one of the following conditions is satisfied:
 1. There is a power failure or power is removed to the device holding the door wings in position.
 2. There is an actuation of the automatic sprinkler system where such system is provided.
 3. There is an actuation of a smoke detection system which is installed in accordance with Section 907 to provide coverage in areas within the building which are within 75 feet of the revolving doors.
 4. There is an actuation of a manual control switch, in an approved location and clearly defined, which reduces the holding force to below the 130-pound force level.

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Power Operated Doors 1010.3.2

- Where means of egress doors are operated or assisted by power, the design shall be such that in the event of power failure, the door is capable of being opened manually to permit means of egress travel or closed where necessary to safeguard means of egress.



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Power Operated Doors 1010.3.2

- The forces required to open these doors manually shall not exceed those specified in Section 1010.1.3, except that the force to set the door in motion shall not exceed 50 pounds.
- The door shall be capable of opening from any position to the full width of the opening in which such door is installed when a force is applied to the door on the side from which egress is made.



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Power Operated Doors 1010.3.2

• Exceptions:

1. Occupancies in Group I-3.
2. Special purpose horizontal sliding, accordion or folding doors complying with Section 1010.1.4.3.
3. For a biparting door in the emergency breakout mode, a door leaf located within a multiple-leaf opening shall be exempt from the minimum 32-inch single-leaf requirement of Section 1010.1.1, provided a minimum 32-inch clear opening is provided when the two biparting leaves meeting in the center are broken out.



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Special purpose horizontal sliding, accordion or folding doors -1010.3.3

- In other than Group H occupancies, special purpose horizontal sliding, accordion or folding door assemblies permitted to be a component of a means of egress in accordance with Exception 6 to Section 1010.1.2 shall comply with all of the following criteria:



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Special purpose horizontal sliding, accordion or folding doors -1010.3.3

- The doors shall be power operated and shall be capable of being operated manually in the event of power failure.
- The doors shall be openable by a simple method from both sides without special knowledge or effort from the egress side or sides.



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Special purpose horizontal sliding, accordion or folding doors -1010.3.3

- The force required to operate the door shall not exceed 30 pounds to set the door in motion and 15 pounds to close the door or open it to the minimum required width.
- The door shall be openable with a force not to exceed 15 pounds when a force of 250 pounds is applied perpendicular to the door adjacent to the operating device.



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Special purpose horizontal sliding, accordion or folding doors -1010.3.3

- The door assembly shall comply with the applicable fire protection rating and, where rated, shall be self-closing or automatic closing by smoke detection in accordance with Section 716.2.6.6, shall be installed in accordance with NFPA 80 and shall comply with Section 716.



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Special purpose horizontal sliding, accordion or folding doors -1010.3.3

- The door assembly shall have an integrated standby power supply.
- The door assembly power supply shall be electrically supervised.
- The door shall open to the minimum required width within 10 seconds after activation of the operating device.



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Security Grilles 1010.3.4

- In Groups B, F, M and S, horizontal sliding or vertical security grilles are permitted at the main exit and shall be openable from the inside without the use of a key or special knowledge or effort during periods that the space is occupied.



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Security Grilles 1010.3.4

- The grilles shall remain secured in the full-open position during the period of occupancy by the general public.
- Where two or more exits are required, not more than one-half of the exits or exit access doorways shall be equipped with horizontal sliding or vertical security grilles.



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1010.5 Turnstiles and similar devices

- Turnstiles or similar devices that restrict travel to one direction shall not be placed so as to obstruct any required means of egress, except where permitted in accordance with Sections 1010.5.1, 1010.5.2 and 1010.5.3.



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Capacity 1010.5.1

Each turnstile or similar device shall be credited with no more than a 50-person capacity where all of the following provisions are met:

1. Each device shall turn free in the direction of egress travel when primary power is lost, and upon the manual release by an employee in the area.
2. Such devices are not given credit for more than 50 percent of the required egress capacity.
3. Each device is not more than 39 inches high.
4. Each device has not less than 16.5 inches clear width at and below a height of 39 inches and not less than 22 inches clear width at heights above 39 inches.

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1010.5.1.1 Clear width

- Where located as part of an accessible route, turnstiles shall have not less than 36 inches clear at and below a height of 34 inches, not less than 32 inches clear width between 34 inches and 80 inches and shall consist of a mechanism other than a revolving device.



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1010.5.2 Security access turnstiles

- Security access turnstiles that inhibit travel in the direction of egress utilizing a physical barrier shall be permitted to be considered as a component of the means of egress, provided that all of the following criteria are met:
 - The building is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 903.3.1.1.
 - 2. Each security access turnstile lane configuration has a minimum clear passage width of 22 inches.



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1010.5.2 Security access turnstiles

- 3. Any security access turnstile lane configuration providing a clear passage width of less than 32 inches shall be credited with a maximum egress capacity of 50 persons.
- 4. Any security access turnstile lane configuration providing a clear passage width of 32 inches or more shall be credited with a maximum egress capacity as calculated in accordance with Section 1005.



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1010.5.2 Security access turnstiles

- 5. Each secured physical barrier shall automatically retract or swing to an unobstructed open position in the direction of egress, under each of the following conditions:
 - 5.1. Upon loss of power to the turnstile or any part of the access control system that secures the physical barrier.



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1010.5.2 Security access turnstiles

- 5.2. Upon actuation of a clearly identified manual release device with ready access that results in direct interruption of power to each secured physical barrier, after which such barriers remain in the open position for not less than 30 seconds. The manual release device shall be positioned at one of the following locations:



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1010.5.2 Security access turnstiles

- 5.2.1. On the egress side of each security access turnstile lane.
- 5.2.2. At an approved location where it can be actuated by an employee assigned to the area at all times that the building is occupied.



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1010.5.2 Security access turnstiles

- 5.3. Upon actuation of the building fire alarm system, if provided, after which the physical barrier remains in the open position until the fire alarm system is manually reset.
- Exception: Actuation of a manual fire alarm box.



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1010.5.2 Security access turnstiles

- 5.4. Upon actuation of the building automatic sprinkler or fire detection system, after which the physical barrier remains in the open position until the fire alarm system is manually reset.



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1010.5.3 High turnstile

- Turnstiles more than 39 inches high shall meet the requirements for revolving doors or the requirements of Section 1010.5.2 for security access turnstiles.



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1010.5.4 Additional door

- Where serving an occupant load greater than 300, each turnstile that is not portable shall have a side-hinged swinging door that conforms to Section 1010.1 within 50 feet.
 - Exception: A side-hinged swinging door is not required at security access turnstiles that comply with Section 1010.5.2.



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Stairways - 1011



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Definitions

- INTERIOR EXIT STAIRWAY.** An exit component that serves to meet one or more means of egress design requirements, such as required number of exits or exit access travel distance, and provides for a protected path of egress travel to the exit discharge or public way.



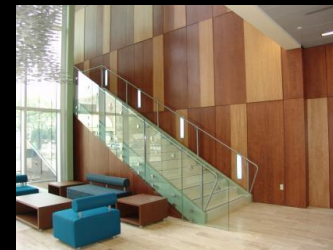
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Definitions

- EXIT ACCESS STAIRWAY.** A stairway within the exit access portion of the means of egress system.

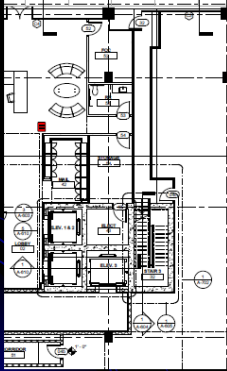


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Interior exit stairways 1023.1



- Interior exit stairways and ramps shall be enclosed and lead directly to the exterior of the building or shall be extended to the exterior of the building with an exit passageway conforming to the requirements of Section 1024, except as permitted in Section 1028.2.
- An interior exit stairway or ramp shall not be used for any purpose other than as a means of egress and a circulation path.

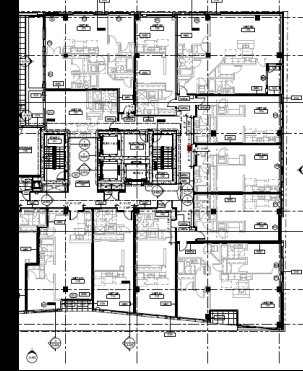
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1023.2 Construction

- Enclosures for interior exit stairways and ramps shall be constructed as fire barriers in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both.
- < 4 stories – 1 hour FRR
- ≥ 4 stories – 2 hour FRR



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1023.2 Construction

- Exceptions:
 1. Interior exit stairways and ramps in Group I-3 occupancies in accordance with the provisions of Section 408.3.8.
 2. Interior exit stairways within an atrium enclosed in accordance with Section 404.6.
 3. Interior exit stairways in accordance with Section 510.2.



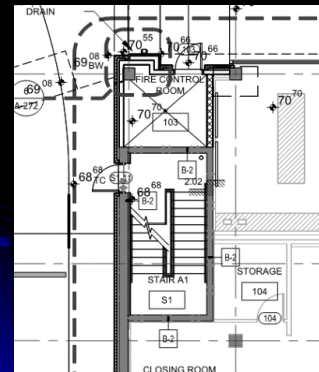
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1023.3 Termination

- Interior exit stairways and ramps shall terminate at an exit discharge or a public way.
 - Exception: A combination of interior exit stairways, interior exit ramps and exit passageways, constructed in accordance with Sections 1023.2, 1023.3.1 and 1024, respectively, and forming a continuous protected enclosure, shall be permitted to extend an interior exit stairway or ramp to the exit discharge or a public way.



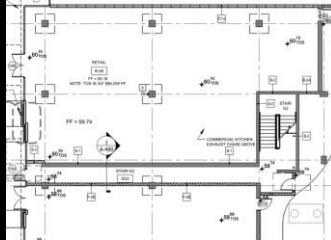
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1023.3.1 Extension

- Where interior exit stairways and ramps are extended to an exit discharge or a public way by an exit passageway, the interior exit stairway and ramp shall be separated from the exit passageway by a fire barrier constructed in accordance with Section 707 or a horizontal assembly constructed in accordance with Section 711, or both.
- The fire-resistance rating shall be not less than that required for the interior exit stairway and ramp.



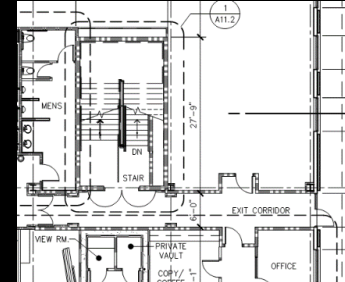
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1023.3.1 Extension

- A fire door assembly complying with Section 716.5 shall be installed in the fire barrier to provide a means of egress from the interior exit stairway and ramp to the exit passageway. Openings in the fire barrier other than the fire door assembly are prohibited. Penetrations of the fire barrier are prohibited.



- 3 Exceptions

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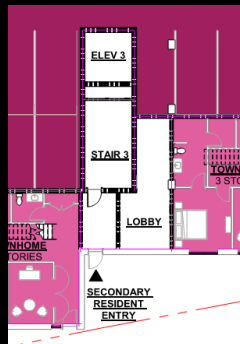
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1023.3.1 Extension

Exceptions:

- 1. Penetrations of the fire barrier in accordance with Section 1023.5 shall be permitted.
- 2. Separation between an interior exit stairway or ramp and the exit passageway extension shall not be required where there are no openings into the exit passageway extension.
- 3. Separation between an interior exit stairway or ramp and the exit passageway extension shall not be required where the interior exit stairway and the exit passageway extension are pressurized in accordance with Section 909.20.5



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Exit access stairways 1019.3

- In other than Group I-2 and I-3 occupancies, floor openings containing exit access stairways or ramps shall be enclosed with a shaft enclosure constructed in accordance with Section 713.



- 9 Exceptions

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Exit access stairways 1019.3

- 1. Exit access stairways and ramps that serve or atmospherically communicate between only two adjacent stories. Such interconnected stories shall not be open to other stories.



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Exit access stairways 1019.3

- 2. In Group R-1, R-2 or R-3 occupancies, exit access stairways and ramps connecting four stories or less serving and contained within an individual dwelling unit or sleeping unit or live/work unit.



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Exit access stairways 1019.3

- 3. Exit access stairways serving and contained within a Group R-3 congregate residence or a Group R-4 facility are not required to be enclosed.



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Exit access stairways 1019.3

- 4. Exit access stairways and ramps in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, where the area of the vertical opening between stories does not exceed twice the horizontal projected area of the stairway or ramp and the opening is protected by a draft curtain and closely spaced sprinklers in accordance with NFPA 13. In other than Group B and M occupancies, this provision is limited to openings that do not connect more than four stories.



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Exit access stairways 1019.3

5. Exit access stairways within an atrium complying with the provisions of Section 404.
6. Exit access stairways and ramps in open parking garages that serve only the parking garage.
7. Exit access stairways and ramps serving smoke-protected or open-air seating complying with the exit access travel distance requirements of Section 1030.7.



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Exit access stairways 1019.3

8. Exit access stairways and ramps between the balcony, gallery or press box and the main assembly floor in occupancies such as theaters, places of religious worship, auditoriums and sports facilities.
9. Exterior exit stairways or ramps between occupied roofs.



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1019.4 Group I-2 and I-3 occupancies

- In Group I-2 and I-3 occupancies, floor openings between stories containing exit access stairways or ramps are required to be enclosed with a shaft enclosure constructed in accordance with Section 713.
- Exception: In Group I-3 occupancies, exit access stairways or ramps constructed in accordance with Section 408 are not required to be enclosed.



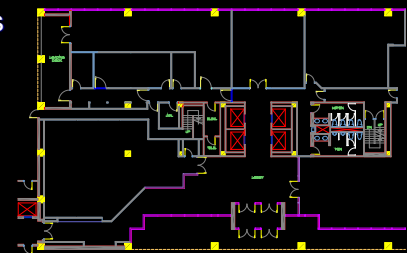
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Exit Components

- Exterior Exit Doors
- Exit Enclosures
- Exit Passageways
- Horizontal Exits
- Exterior Exit Stair/Ramps



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1023.12 Smokeproof enclosures

- Where required by Section 403.5.4 or 405.7.2 or 412.2.2.1, interior exit stairways and ramps shall be smokeproof enclosures in accordance with Section 909.20.



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403.5.4 High-Rise Buildings

- Every required interior exit stairway serving floors more than 75 feet above the lowest level of fire department vehicle access shall be a smokeproof enclosure in accordance with Sections 909.20 and 1023.12.



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405.7.2 Underground Buildings

- Every required stairway serving floor levels more than 30 feet below the finished floor of its level of exit discharge shall comply with the requirements for a smokeproof enclosure as provided in Section 1023.12.



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412.2.2.1 Airport Traffic Control Towers

- Stairways in airport traffic control towers shall be in accordance with Section 1011.
- Exit stairways shall be smokeproof enclosures complying with one of the alternatives provided in Section 909.20.



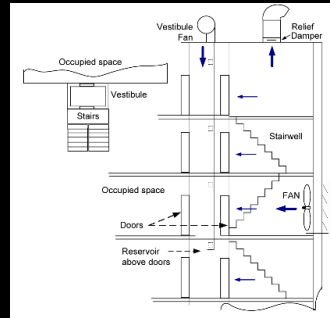
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Smokeproof Enclosure Definition

- An exit stairway or ramp designed and constructed so that the movement of the products of combustion produced by a fire occurring in any part of the building into the enclosure is limited.



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1023.12.1 Termination and extension

- A smokeproof enclosure shall terminate at an exit discharge or a public way.
- The smokeproof enclosure shall be permitted to be extended by an exit passageway in accordance with Section 1023.3.
- The exit passageway shall be without openings other than the fire door assembly required by Section 1023.3.1 and those necessary for egress from the exit passageway.
- The exit passageway shall be separated from the remainder of the building by 2-hour fire barriers or horizontal assemblies, or both.



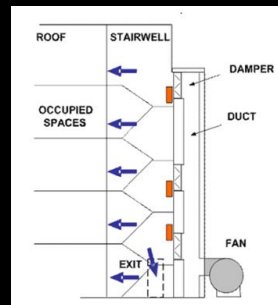
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1023.12.1 Termination and extension

- Exceptions:
- 1. Openings in the exit passageway serving a smokeproof enclosure are permitted where the exit passageway is protected and pressurized in the same manner as the smokeproof enclosure, and openings are protected as required for access from other floors.



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1023.12.1 Termination and extension

- 2. The fire barrier separating the smokeproof enclosure from the exit passageway is not required, provided that the exit passageway is protected and pressurized in the same manner as the smokeproof enclosure.
- 3. A smokeproof enclosure shall be permitted to egress through areas on the level of exit discharge or vestibules as permitted by Section 1028.



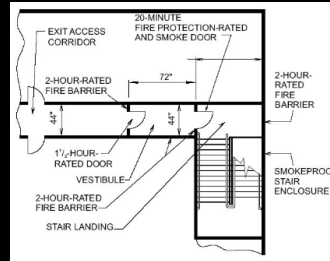
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Enclosure Access 1023.12.2

- Access to the stairway or ramp within a smokeproof enclosure shall be by way of a vestibule or an open exterior balcony.
- Exception: Access is not required by way of a vestibule or exterior balcony for stairways and ramps using the pressurization alternative complying with Section 909.20.5.



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1023.13 Standpipes

- Standpipes and standpipe hose connections shall be provided where required by Sections 905.3 and 905.4.



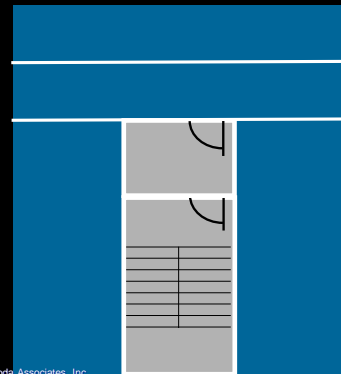
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Access 909.20.1

- Access to the stairway or ramp shall be by way of a vestibule or an open exterior balcony.
- The minimum dimension of the vestibule shall be not less than the required width of the corridor leading to the vestibule but shall not have a width of less than 44 inches and shall not have a length of less than 72 inches in the direction of egress travel.

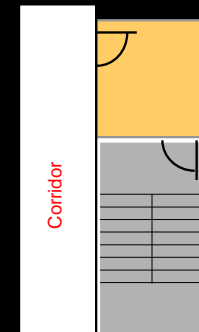


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Construction 909.20.2

- The smokeproof enclosure shall be separated from the remainder of the building by not less than a 2-hour fire-resistance-rated fire barrier or horizontal assemblies or both.
- Openings not permitted other than the required means of egress doors.



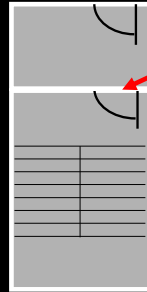
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Construction 909.20.2

- The vestibule shall be separated from the stairway by not less than a 2-hour fire-resistance-rated fire barrier or horizontal assembly.



2 hour wall
20 Minute door

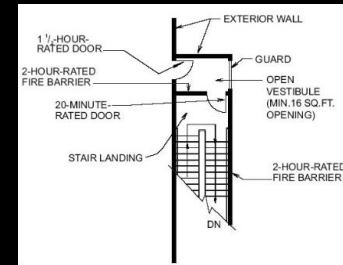
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Construction 909.20.2

- The open exterior balcony shall be constructed in accordance with the fire-resistance-rating requirements for floor construction.



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Door Closers 909.20.2.1



- Self- or automatic-closing by actuation of a smoke detector installed at the floor-side entrance to the smokeproof enclosure
- The actuation of the smoke detector on any door shall activate the closing devices on all doors in the smokeproof enclosure at all levels.
- Smoke detectors shall be installed in accordance with Section 907.10.

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Natural Ventilation Alternative 909.20.3



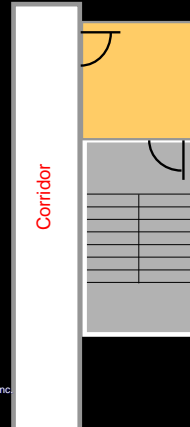
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Balcony Doors 909.20.3.1

- Where access to the stairway or ramp is by way of an open exterior balcony, the door assembly into the enclosure shall be a fire door in accordance with Section 716.



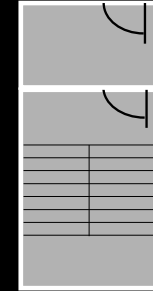
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Vestibule Doors 909.20.3.2

- Where access to the stairway or ramp is by way of a vestibule, the door assembly into the vestibule shall be a fire door complying with Section 716.
- The door assembly from the vestibule to the stairway shall have not less than a 20-minute fire protection rating complying with Section 716.



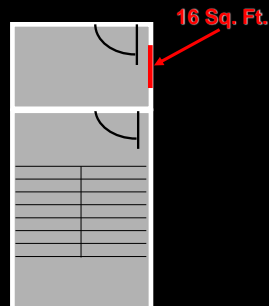
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Vestibule Ventilation 909.20.3.3

- Each vestibule shall have a minimum net area of 16 square feet of opening in a wall facing an outer court, yard or public way that is not less than 20 feet in width.



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Mechanical Ventilation Alternative 909.20.4

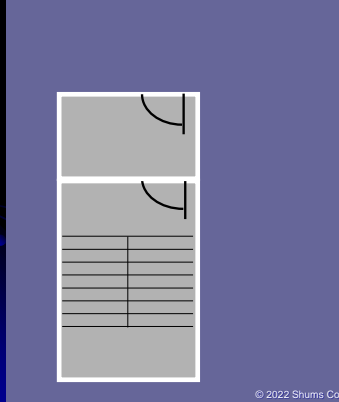


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Vestibule Doors 909.20.4.1



- The door assembly from the building into the vestibule shall be a fire door assembly complying with Section 716.2.2.1.
- The door assembly from the vestibule to the stairway or ramp shall not have less than a 20-minute fire protection rating and shall meet the requirements for a smoke door assembly in accordance with Section 716.2.2.1.
- The door shall be installed in accordance with NFPA 105.

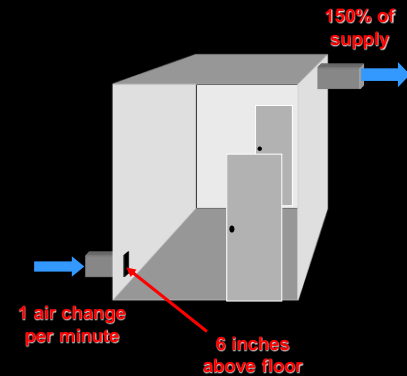
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Vestibule Ventilation 909.20.4.2

- The vestibule shall be supplied with not less than one air change per minute and the exhaust shall be not less than 150 percent of supply.
- Supply air shall enter and exhaust air shall discharge from the vestibule through separate, tightly constructed ducts used only for that purpose.
- Supply air shall enter the vestibule within 6 inches of the floor level.



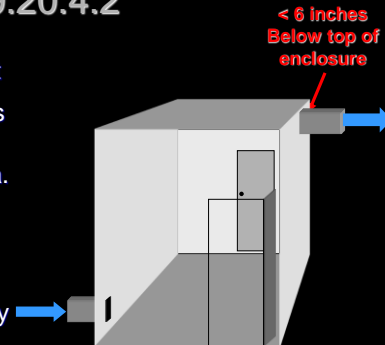
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Vestibule Ventilation 909.20.4.2

- The top of the exhaust register shall be located at the top of the smoke trap but not more than 6 inches down from the top of the trap, and shall be entirely within the smoke trap area.
- Doors in the open position shall not obstruct duct openings.
- Duct openings with controlling dampers are permitted where necessary to meet the design requirements, but dampers are not otherwise required.

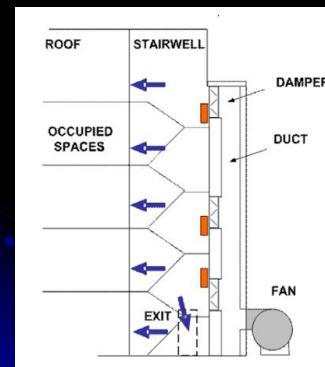


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Engineered Ventilation System 909.20.4.2.1



- Where a specially engineered system is used, the system shall exhaust a quantity of air equal to not less than 90 air changes per hour from any vestibule in the emergency operation mode and shall be sized to handle three vestibules simultaneously.
- Smoke detectors shall be located at the floor-side entrance to each vestibule and shall activate the system for the affected vestibule. Smoke detectors shall be installed in accordance with Section 907.3.

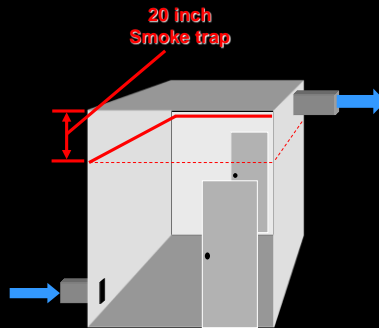
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Smoke Trap 909.20.4.3

- The vestibule ceiling shall be not less than 20 inches higher than the door opening into the vestibule to serve as a smoke and heat trap and to provide an upward-moving air column.
- The height shall not be decreased unless approved and justified by design and test.



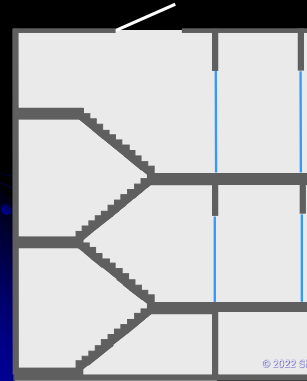
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Stairway or Ramp Shaft Air Movement System 909.20.4.4

- The stairway or ramp shaft shall be provided with a dampered relief opening and supplied with sufficient air to maintain a minimum positive pressure of 0.10 inch of water in the shaft relative to the vestibule with all doors closed.



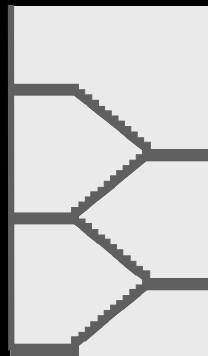
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Stairway or Ramp Pressurization Alternative 909.20.5

- Where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1, the vestibule is not required, provided each interior exit stairway or ramp is pressurized to not less than 0.10 inch of water (25 Pa) and not more than 0.35 inches of water in the shaft relative to the building measured with all interior exit stairway and ramp doors closed under maximum anticipated conditions of stack effect and wind effect.



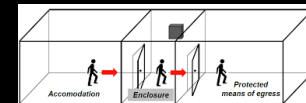
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909.20.6 – Pressurized stair and vestibule alternative

- The provisions of Sections 909.20.6.1 through 909.20.6.3 shall apply to smokeproof enclosures using a pressurized stair and pressurized entrance vestibule.

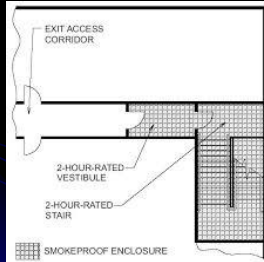


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909.20.6.1 Vestibule doors



- The door assembly from the building into the vestibule shall be a fire door assembly complying with Section 716.2.2.1.
- The door assembly from the vestibule to the stairway shall have not less than a 20-minute fire protection rating and meet the requirements for a smoke door assembly in accordance with Section 716.2.2.1.
- The door shall be installed in accordance with NFPA 105.

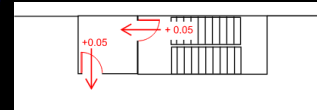
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909.20.6.2 Pressure difference

- The stair enclosure shall be pressurized to not less than 0.05 inch of water gage positive pressure relative to the vestibule with all stairway doors closed under the maximum anticipated stack pressures.
- The vestibule, with doors closed, shall have not less than 0.05 inch of water gage positive pressure relative to the fire floor.
- The pressure difference across doors shall not exceed 30 pounds maximum force to begin opening the door.



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909.20.6.3 Dampened relief opening

- A controlled relief vent having the capacity to discharge not less than 2,500 cubic feet per minute of air at the design pressure difference shall be located in the upper portion of the pressurized exit enclosure.

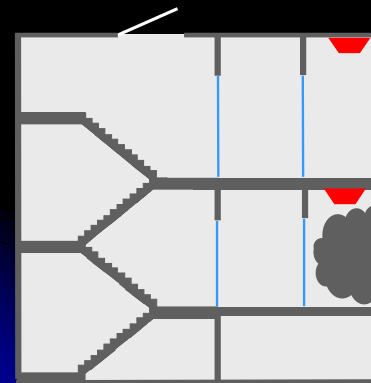


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Ventilating Equipment 909.20.7



- The activation of ventilating equipment required by the alternatives in Sections 909.20.4 and 909.20.5 shall be by smoke detectors installed at each floor level at an approved location at the entrance to the smokeproof enclosure.
- When the closing device for the stair shaft and vestibule doors is activated by smoke detection or power failure, the mechanical equipment shall activate and operate at the required performance levels.
- Smoke detectors shall be installed in accordance with Section 907.10.

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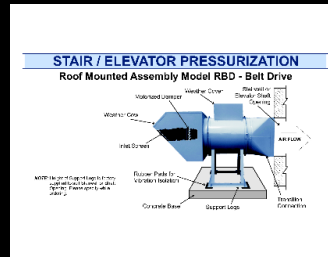
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Ventilation Systems 909.20.7.1

- Smokeproof enclosure ventilation systems shall be independent of other building ventilation systems. The equipment and ductwork shall comply with one of the following:

- Equipment, control wiring, power wiring and ductwork shall be located exterior to the building and directly connected to the smokeproof enclosure or connected to the smokeproof enclosure by ductwork enclosed by not less than 2-hour fire barriers or horizontal assemblies, or both

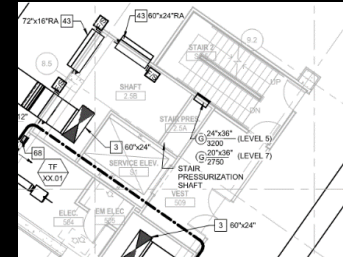


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Ventilation Systems 909.20.7.1

- Equipment, control wiring, power wiring and ductwork shall be located within the smokeproof enclosure with intake or exhaust directly from and to the outside or through ductwork enclosed by not less than 2-hour fire barriers or horizontal assemblies, or both.
- Equipment, control wiring, power wiring and ductwork shall be located within the building if separated from the remainder of the building, including other mechanical equipment, by not less than 2-hour fire barriers or horizontal assemblies, or both.

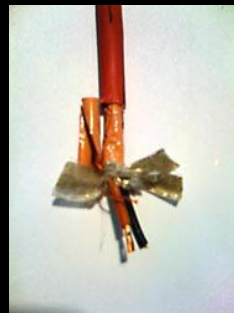


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Ventilation Systems 909.20.7.1

- Control wiring and power wiring located out-side of a 2-hour fire barrier construction shall be protected using any one of the following methods:
 - Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196 and shall have a fire-resistance rating of not less than 2 hours.
 - Where encased with not less than 2 inches of concrete.
 - Electrical circuit protective systems shall have a fire-resistance rating of not less than 2 hours. Electrical circuit protective systems shall be installed in accordance with their listing requirements.



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Standby Power 909.20.7.2

- Mechanical vestibule and stairway and ramp shaft ventilation systems and automatic fire detection systems shall be provided with standby power in accordance with Section 2702.



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Acceptance And Testing 909.20.7.3



- Before the mechanical equipment is approved, the system shall be tested in the presence of the building official to confirm that the system is operating in compliance with these requirements.

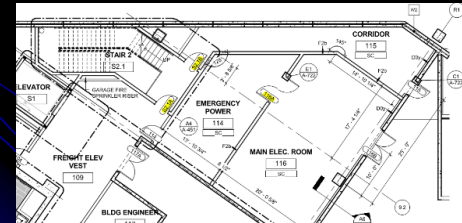
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1024.1 Exit passageways

- Exit passageways serving as an exit component in a means of egress system shall comply with the requirements of this section.
- An exit passageway shall not be used for any purpose other than as a means of egress and a circulation path.



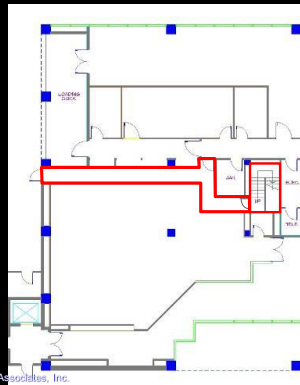
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Exit Passageways 202

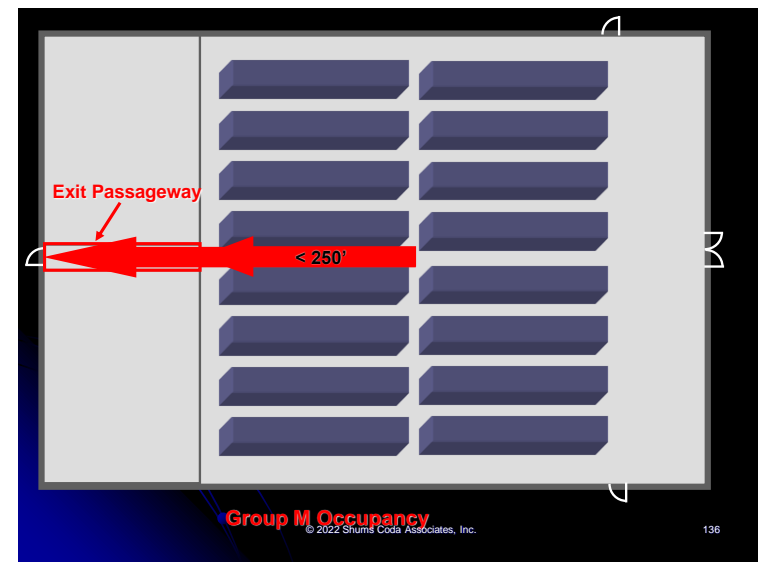
- An exit component that is separated from all other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives, and provides for a protected path of egress travel in a horizontal direction to the exit discharge or the public way.



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Group M Occupancy

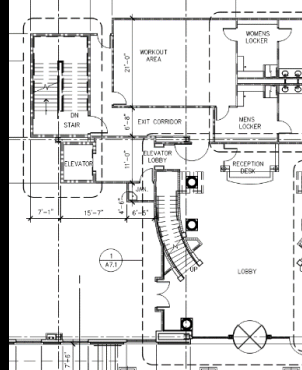
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Width 1024.2

- The required capacity of exit passageways shall be determined as specified in Section 1005.1 but the minimum width shall be not less than 44 inches, except that exit passageways serving an occupant load of less than 50 shall be not less than 36 inches in width.
- The minimum width or required capacity of exit passageways shall be unobstructed.
- Exception: Encroachments complying with Section 1005.7.



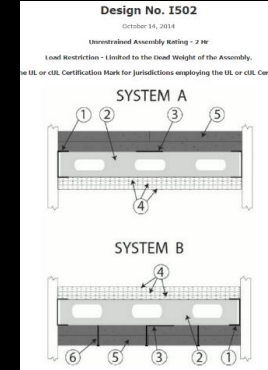
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Construction 1024.3

- Exit passageway enclosures shall have walls, floors and ceilings of not less than a 1-hour fire-resistance rating, and not less than that required for any connecting interior exit stairway or ramp.
- Exit passageways shall be constructed as fire barriers or horizontal assemblies, or both.



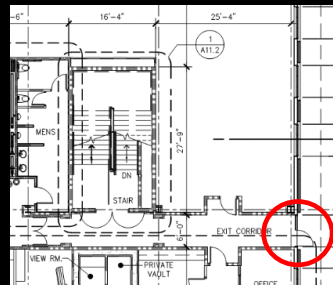
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Termination 1024.4

- Exit passageways on the level of exit discharge shall terminate at an exit discharge.
- Exit passageways on other levels shall terminate at an exit.



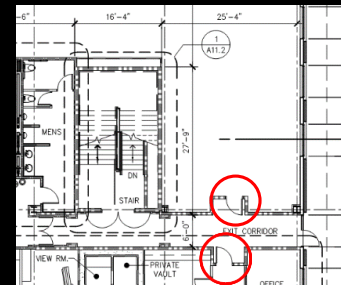
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Openings 1024.5

- Exit passageway opening protectives shall be in accordance with the requirements of Section 715.
- Except as permitted in Section 402.8.7, openings in exit passageways other than unexposed exterior openings shall be limited to those necessary for exit access to the exit passageway from normally occupied spaces and for egress from the exit passageway.

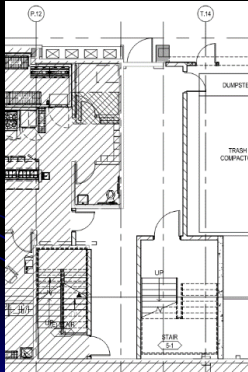


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Openings And Penetrations 1024.5



- Where an interior exit stairway or ramp is extended to an exit discharge or a public way by an exit passageway, the exit passageway shall also comply with Section 1023.3.1.
- Elevators shall not open into an exit passageway.

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1024.6 Penetrations

- Penetrations into or through an exit passageway are prohibited except for the following:
 - 1. Equipment and ductwork necessary for independent ventilation or pressurization.
 - 2. Fire protection systems.
 - 3. Security systems.
 - 4. Two-way communication systems.
 - 5. Electrical raceway for fire department communication.
 - 6. Electrical raceway serving the exit passageway and terminating at a steel box not exceeding 16 square inches.



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1024.6 Penetrations

- Such penetrations shall be protected in accordance with Section 714. There shall not be penetrations or communicating openings, whether protected or not, between adjacent exit passageways.
- Exception: Membrane penetrations shall be permitted on the outside of the exit passageway. Such penetrations shall be protected in accordance with Section 714.4.2.



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1024.7 Ventilation

- Equipment and ductwork for exit passageway ventilation as permitted by Section 1024.6 shall comply with one of the following:
 - 1. The equipment and ductwork shall be located exterior to the building and shall be directly connected to the exit passageway by ductwork enclosed in construction as required for shafts.



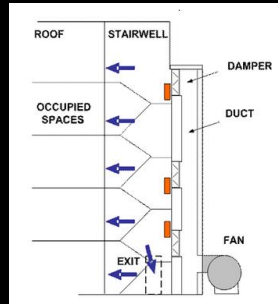
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1024.7 Ventilation

- 2. Where the equipment and ductwork is located within the exit passageway, the intake air shall be taken directly from the outdoors and the exhaust air shall be discharged directly to the outdoors, or the air shall be conveyed through ducts enclosed in construction as required for shafts.
- 3. Where located within the building, the equipment and ductwork shall be separated from the remainder of the building, including other mechanical equipment, with construction as required for shafts.



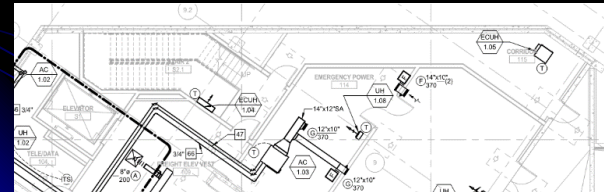
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1024.7 Ventilation

- In each case, openings into the fire-resistance-rated construction shall be limited to those needed for maintenance and operation and shall be protected by opening protectives in accordance with Section 716 for shaft enclosures.
- Exit passageway ventilation systems shall be independent of other building ventilation systems.



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1024.8 Exit passageway exterior walls

- Exterior walls of the exit passageway shall comply with Section 705.
- Where nonrated walls or unprotected openings enclose the exterior of the exit passageway and the walls or openings are exposed by other parts of the building at an angle of less than 180 degrees, the building exterior walls within 10 feet horizontally of a nonrated wall or unprotected opening shall have a fire-resistance rating of not less than 1 hour.

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1024.8 Exit passageway exterior walls

- Openings within such exterior walls shall be protected by opening protectives having a fire protection rating of not less than 3/4 hour.
- This construction shall extend vertically from the ground to a point 10 feet above the floor of the exit passageway, or to the roof line, whichever is lower.

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1024.9 Standpipes



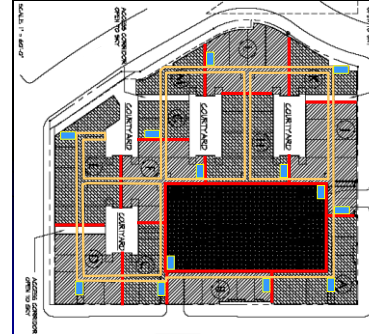
- Standpipes and standpipe hose connections shall be provided where required by Sections 905.3 and 905.4.

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Horizontal Exits 1026



- Horizontal exits serving as an exit in a means of egress system shall comply with the requirements of this section.
- A horizontal exit shall not serve as the only exit from a portion of a building, and where two or more exits are required, not more than one-half of the total number of exits total exit minimum width or required capacity shall be horizontal exits.

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Horizontal Exits (Exceptions) 1026



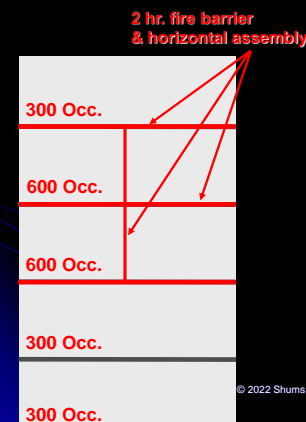
- Horizontal exits are permitted to comprise two-thirds of the required exits from any building or floor area for occupancies in Group I-2.
- Horizontal exits are permitted to comprise 100 percent of the exits required for occupancies in Group I-3. Not less than 6 square feet of accessible space per occupant shall be provided on each side of the horizontal exit for the total number of people in adjoining compartments.

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Separation 1026.2



- The separation between buildings or areas of refuge connected by a horizontal exit shall be provided by a fire wall or a fire barrier having a fire-resistance rating of not less than 2 hours.
- Opening protectives in horizontal exit walls shall also comply with Section 716.
- Duct and air transfer openings in a fire wall or fire barrier that serves as a horizontal exit shall also comply with Section 717.
- The horizontal exit separation shall extend vertically through all levels of the building unless floor assemblies have a fire-resistance rating of not less than 2 hours with no unprotected openings.

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Opening Protectives 1026.3



- Fire doors in horizontal exits shall be self-closing or automatic-closing when activated by a smoke detector in accordance with Section 716.2.6.6.
- Doors, where located in a cross-corridor condition, shall be automatic-closing by activation of a smoke detector installed in accordance with Section 716.2.6.6.

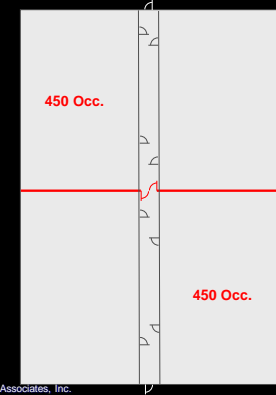
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Refuge Area 1026.4

- The refuge area of a horizontal exit shall be a space occupied by the same tenant or a public area and each such area of refuge shall be adequate to house the original occupant load of the refuge space plus the occupant load anticipated from the adjoining compartment.
- The anticipated occupant load from the adjoining compartment shall be based on the capacity of the horizontal exit doors entering the area of refuge or the total occupant load of the adjoining compartment, whichever is less.



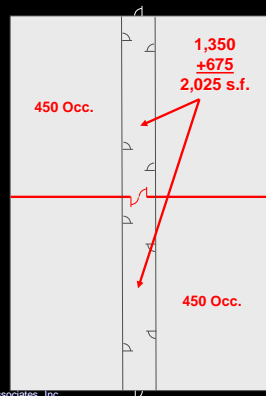
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Capacity 1026.4.1

- The capacity of the refuge area shall be computed based on a net floor area allowance of 3 square feet for each occupant to be accommodated therein.



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Capacity 1026.4.1

- Where the horizontal exit also forms a smoke compartment, the capacity of the refuge area for Group I-1, I-2 and I-3 occupancies and Group B ambulatory care facilities shall comply with Sections 407.5.3, 408.6.2, 420.6.1 and 422.3.2 as applicable.



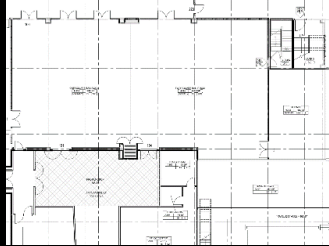
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Number of exits 1026.4.2

- The refuge area into which a horizontal exit leads shall be provided with exits adequate to meet the occupant requirements of this chapter, but not including the added occupant load imposed by persons entering it through horizontal exits from other areas.
- Not less than one refuge area exit shall lead directly to the exterior or to an interior exit stairway or ramp.



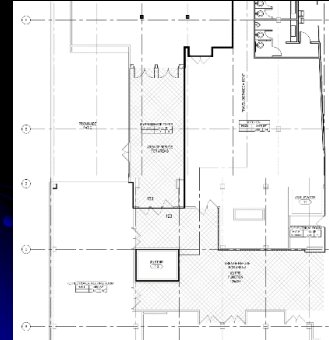
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Number of exits 1026.4.2

- Exception:
The adjoining compartment shall not be required to have a stairway or door leading directly outside, provided the refuge area into which a horizontal exit leads has stairways or doors leading directly outside and are so arranged that egress shall not require the occupants to return through the compartment from which egress originates.



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1026.5 Standpipes

- Standpipes and standpipe hose connections shall be provided where required by Sections 905.3 and 905.4.



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Luminous Egress Path Markings 1025.1



- Approved luminous egress path markings delineating the exit path shall be provided in high rise buildings of Groups A, B, E, I-1, M and R-1.

- Exceptions:
Not required on the level of exit discharge in lobbies that serve as part of the exit path in accordance with Section 1028.2, Exception 1.

Retroactive in IFC!

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Markings within Exit Enclosures 1025.2

- Steps
 - 1-2" at leading edge
- Landings
 - 1-2" at leading edge
- Handrails
 - 1" min. on handrail and extension



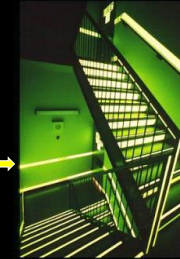
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Markings within Exit Enclosures 1025.2

- Floor Mounted
 - Placed within 4" of the wall
- Wall Mounted
 - Placed within 4" of the floor
- Transition
 - ?



Not Compliant!

- Stair landings and other floor areas within exit enclosures, with the exception of the sides of steps, shall be provided with solid and continuous demarcation lines on the floor or on the walls or a combination of both.
- The stripes shall be 1 to 2 inches wide with interruptions not exceeding 4 inches.

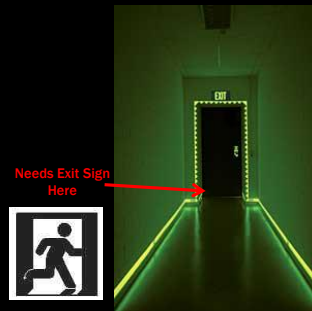
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Markings within Exit Enclosures 1025.2

- Obstacles
 - Located below 78" and extending out more than 4" must be marked
- Doors
 - Hardware
 - Frame
 - Low level exit sign per NFPA 170 (18" above floor)



Needs Exit Sign Here

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Self Luminous and Photoluminescent 1025.4

- If photoluminescent material is used, egress lighting must be maintained for 60 minutes BEFORE the building is occupied.
- Luminous egress path markings shall be permitted to be made of any material, including paint, provided that an electrical charge is not required to maintain the required luminance. Such materials shall include, but are not limited to, *self-luminous materials* and *photoluminescent materials*. Materials shall comply with either of the following standards:
 1. UL 1994
 2. ASTM E 2072, except that the charging source shall be 1 foot-candle of fluorescent illumination for 60 minutes, and the minimum luminance shall be 30 millicandelas per square meter at 10 minutes and 5 millicandelas per square meter after 90 minutes.

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Illumination 1025.5

- Where photoluminescent exit path markings are installed, they shall be provided with not less than 1 footcandle of illumination for not less than 60 minutes prior to periods when the building is occupied and continuously during occupancy.



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Exit Discharge 1028.2

- Exits shall discharge directly to the exterior of the building.
- The exit discharge shall be at grade or shall provide direct access to grade.
- The exit discharge shall not reenter a building.
- The combined use of Exceptions 1 and 2 below shall not exceed 50 percent of the number and capacity of the required exits.



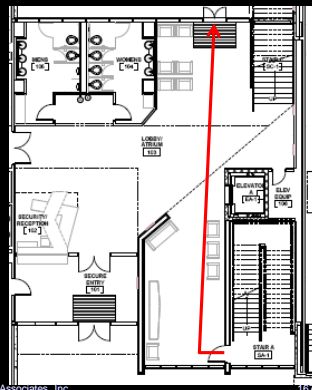
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Exit Discharge 1028.2 Exceptions

- Not more than 50 percent of the number and minimum width or capacity of interior exit stairways and ramps is permitted to egress through areas, including atriums, on the level of exit discharge provided all of the following are met:
 - Discharge of interior exit stairways and ramps shall be provided with a free and unobstructed path of travel to an exterior exit door and such exit is readily visible and identifiable from the point of termination of the enclosure.



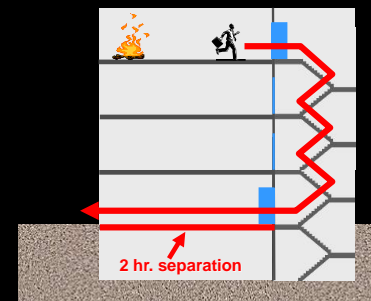
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Exit Discharge 1028.2 Exceptions

- The entire area of the level of exit discharge is separated from areas below by construction conforming to the fire-resistance rating for the enclosure.



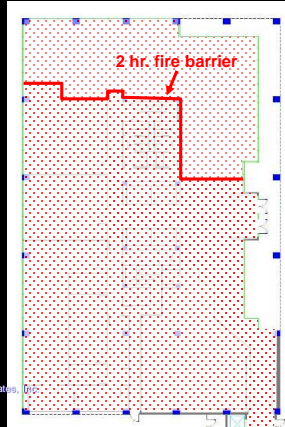
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Exit Discharge 1028.2 Exceptions

3. The egress path from the exit enclosure on the level of discharge is protected throughout by an approved automatic sprinkler system. Portions of the level of discharge with access to the egress path shall either be equipped throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, or separated from the egress path in accordance with the requirements for the enclosure of interior exit stairways and ramps.



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Exit Discharge 1028.2 Exceptions

4. Where a required interior exit stairway or ramp and an exit access stairway or ramp serve the same floor level and terminate at the same level of exit discharge, the termination of the exit access stairway or ramp and the exit discharge door of the interior exit stairway or ramp shall be separated by a distance of not less than 30 feet or not less than one-fourth the length of the maximum overall diagonal dimension of the building, whichever is less.
5. The distance shall be measured in a straight line between the exit discharge door from the interior exit stairway or ramp and the last tread of the exit access stairway or termination of slope of the exit access ramp.

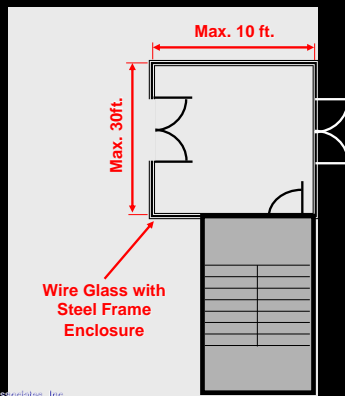
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Exit Discharge 1028.2 Exceptions

- 2. Not more than 50 percent of the number and minimum width or capacity of the interior exit stairways and ramps is permitted to egress through a vestibule provided all of the following conditions are met:
 - 2.1. The entire area of the vestibule is separated from areas below by construction conforming to the fire-resistance rating of the interior exit stairway or ramp enclosure.
 - 2.2. The depth from the exterior of the building is not greater than 10 feet and the length is not greater than 30 feet.
 - 2.3. The area is separated from the remainder of the level of exit discharge by a fire partition.
 - 2.4. The area is used only for means of egress and exits directly to the outside.

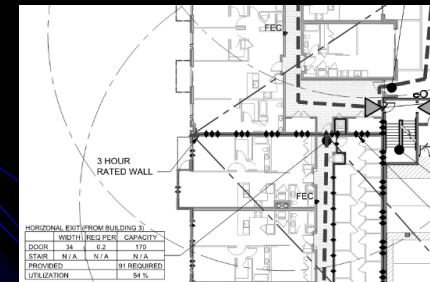


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Exit Discharge 1028.2 Exceptions

3. Horizontal exits complying with Section 1026 shall not be required to discharge directly to the exterior of the building.



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Assembly Main Exit 1030.2

- Group A occupancy -
- Main exit shall front on not less than one street or an unoccupied space of not less than 10 feet in width that adjoins a street or public way.
- In a building, room or space used for assembly purposes where there is not a well-defined main exit or where multiple main exits are provided, exits shall be permitted to be distributed around the perimeter of the building provided that the total capacity of egress is not less than 100 percent of the required capacity.



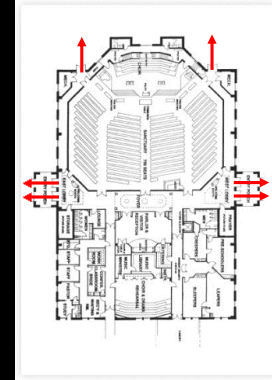
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Assembly Other Exits 1030.3

- In addition to having access to a main exit, each level in a building used for assembly purposes having an occupant load greater than 300 and provided with a main exit, shall be provided with additional means of egress that shall provide an egress capacity for not less than one-half of the total occupant load served by that level and shall comply with Section 1007.1.



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Assembly Other Exits 1030.3

- In a building used for assembly purposes where there is not a well-defined main exit or where multiple main exits are provided, exits for each level shall be permitted to be distributed around the perimeter of the building, provided that the total width of egress is not less than 100 percent of the required width.



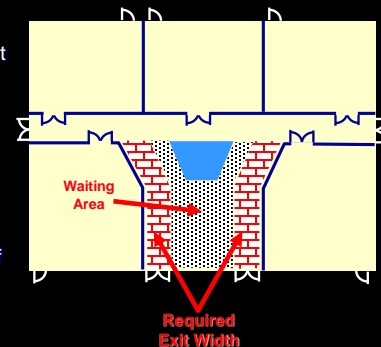
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Foyers And Lobbies 1030.4

- In Group A-1 occupancies, where persons are admitted to the building at times when seats are not available, such persons shall be allowed to wait in a lobby or similar space, provided such lobby or similar space shall not encroach upon the minimum width or capacity of the means of egress.
- Such foyer, if not directly connected to a public street by all the main entrances or exits, shall have a straight and unobstructed corridor or path of travel to every such main entrance or exit.

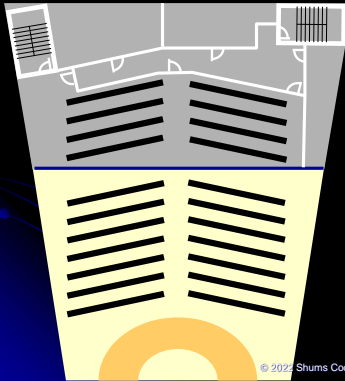


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Interior Balcony And Gallery Means Of Egress - 1030.5



- For balconies, galleries or press boxes having a seating capacity of 50 or more located in a building, room or space used for assembly purposes, not less than two means of egress shall be provided, with one from each side of every balcony, gallery or press box.

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Width Of Means Of Egress For Assembly - 1030.6

- The required capacity of aisles shall be not less than that determined in accordance with Section 1030.6.1 where smoke-protected assembly seating is not provided and with Section 1030.6.2 where smoke-protected assembly seating is provided and 1030.6.3 where open-air assembly seating is provided..



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Smoke-protected Assembly Seating.



- Seating served by means of egress that is not subject to smoke accumulation within or under a structure.

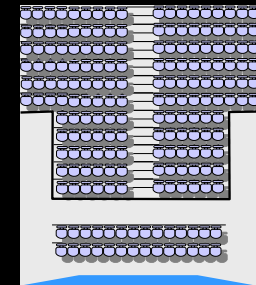
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Width Without Smoke Protection 1030.6.1

- be provided on stepped aisles having riser heights 7 inches or less and tread depths 11 inches or greater, measured horizontally between tread nosings.
- Not less than 0.005 inch of additional aisle capacity for each occupant shall be provided for each 0.10 inch of riser height above 7 inches.



7"/11" stairs
 $168 \text{ seats} \times 0.3 = 50.4''$

7.5"/11" stairs
 $168 \times 0.325 = 54.6''$

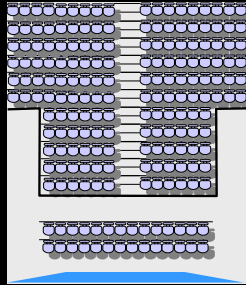
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Width Without Smoke Protection 1030.6.1

3. Where egress requires stepped aisle descent, not less than 0.075 inch of additional aisle capacity for each occupant shall be provided on those portions of aisle capacity having no handrail within a horizontal distance of 30 inches.



7"/11" stairs w/o handrail
 $50.4'' + (168 \times 0.075) = 63''$

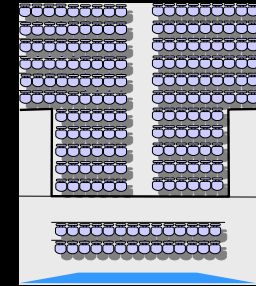
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Width Without Smoke Protection 1030.6.1

4. Ramped aisles, where slopes are steeper than one unit vertical in 12 units horizontal (8-percent slope), shall have not less than 0.22 inch of clear aisle capacity for each occupant served. Level or ramped aisles, where slopes are not steeper than one unit vertical in 12 units horizontal (8-percent slope), shall have not less than 0.20 inch of clear aisle capacity for each occupant served.



1:10 sloped ramp
 $168 \times 0.22 = 36.96''$

1:12 sloped ramp
 $168 \times 0.2 = 33.6''$

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Smoke-protected Seating 1030.6.2

- The clear width shall be not less than the occupant load served multiplied by the appropriate factor in Table 1030.6.2.
- The total number of seats specified shall be those within the space exposed to the same smoke-protected environment.
- Interpolation is permitted



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WIDTH OF AISLES FOR SMOKE-PROTECTED ASSEMBLY

TOTAL NUMBER OF SEATS IN THE SMOKE-PROTECTED ASSEMBLY SEATING	INCHES OF CAPACITY PER SEAT SERVED			
	Stepped aisles with handrails within 30 inches	Stepped aisles without handrails within 30 inches	Level aisles or ramped aisles not steeper than 1 in 10 in slope	Ramped aisles steeper than 1 in 10 in slope
Equal to or less than 5,000	0.200	0.250	0.150	0.165
10,000	0.130	0.163	0.100	0.110
15,000	0.096	0.120	0.070	0.077
20,000	0.076	0.095	0.056	0.062
Equal to or greater than 25,000	0.060	0.075	0.044	0.048

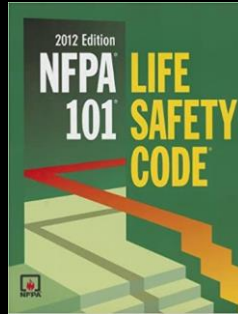
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Smoke-protected Seating 1030.6.2

- A life safety evaluation, complying with NFPA 101, shall be done for a facility utilizing the reduced width requirements of Table 1030.6.2 for smoke-protected assembly seating.



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Life Safety Evaluation NFPA 101

- A written review dealing with the adequacy of life safety features relative to fire, storm, collapse, crowd behavior and other related safety considerations



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Life Safety Evaluations NFPA 101 Section 12.4.1

- Performed by persons acceptable to AHJ
- Must be approved annually by AHJ
- Must be updated for special or unusual conditions



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Life Safety Evaluations NFPA 101 Section 12.4.1

- Performance based approach to life safety
- Deals with fire, storm, collapse, crowd behavior and other related safety considerations
- Safety Factor of 2.0



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Evaluation Factors NFPA 101 A.12.4.1.3

- Nature Of Events Being Accommodated
- Occupant Characteristics And Behavior
- Management
- Emergency Management Preparedness
- Building Systems



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Smoke Control 1030.6.2.1

- Aisles and aisle accessways serving a smoke-protected assembly seating area shall be provided with a smoke control system complying with Section 909 or natural ventilation designed to maintain the smoke level not less than 6 feet above the floor of the means of egress.



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Roof Height 1030.6.2.2

- A smoke-protected assembly seating area with a roof shall have the lowest portion of the roof deck not less than 15 feet above the highest aisle or aisle accessway.
 - Exception: A roof canopy in an outdoor stadium shall be permitted to be less than 15 feet above the highest aisle or aisle accessway provided that there are no objects less than 80 inches above the highest aisle or aisle accessway.



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Automatic Sprinklers 1030.6.2.3

- Enclosed areas with walls and ceilings in buildings or structures containing smoke-protected assembly seating shall be protected with an approved automatic sprinkler system in accordance with Section 903.3.1.1.



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Automatic Sprinklers 1030.6.2.3

- Exceptions:

1. The floor area used for contests, performances or entertainment provided the roof construction is more than 50 feet above the floor level and the use is restricted to low fire hazard uses.
2. Press boxes and storage facilities less than 1,000 square feet in area.



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1030.6.3 Open-air assembly seating

- In open-air assembly seating, the required capacity in inches (mm) of aisles shall be not less than the total occupant load served by the egress element multiplied by 0.08 where egress is by stepped aisle and multiplied by 0.06 where egress is by level aisles and ramped aisles.



$$440 \times 0.08 = 35.2''$$

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Width Of Means Of Egress For Outdoor Smoke-protected Assembly - 1030.6.3

- Exception:

- The required capacity in inches of aisles shall be permitted to comply with Section 1030.6.2 for the number of seats in the open-air assembly seating where Section 1030.6.2 permits less capacity.



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1030.6.3.1 Automatic sprinklers

- Enclosed areas with walls and ceilings in buildings or structures containing open-air assembly seating shall be protected with an approved automatic sprinkler system in accordance with Section 903.3.1.1.
- Exceptions:
 1. The floor area used for contests, performances or entertainment, provided that the roof construction is more than 50 feet above the floor level and the use is restricted to low fire hazard uses.



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1030.6.3.1 Automatic sprinklers

- 2. Press boxes and storage facilities less than 1,000 square feet in area.
- 3. Open-air assembly seating facilities where seating and the means of egress in the seating area are essentially open to the outside.



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1030.7 Travel distance

- The exit access travel distance shall comply with Section 1017.
- Where aisles are provided for seating, the distance shall be measured along the aisles and aisle accessways without travel over or on the seats.
 - 3 Exceptions



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Travel Distance 1030.7 Exceptions

- 1. In facilities with smoke-protected assembly seating, the total exit access travel distance shall be not greater than 400 feet. That portion of the total permitted exit access travel distance from each seat to the nearest entrance to a vomitory or concourse shall not exceed 200 feet. The portion of the total permitted exit access travel distance from the entrance to the vomitory or concourse to one of the following shall not exceed 200 feet:
 - 1.1. The closest riser of an exit access stairway.
 - 1.2. The closest slope of an exit access ramp.
 - 1.3. An exit.



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Travel Distance 1030.7 Exceptions

- 2. In facilities with open-air assembly seating of Type III, IV or V construction, the total exit access travel distance to one of the following shall not exceed 400 feet:
 - 2.1. The closest riser of an exit access stairway.
 - 2.2. The closest slope of an exit access ramp.
 - 2.3. An exit.



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Travel Distance 1030.7 Exceptions

- 3. In facilities with open-air assembly seating of Type I or II construction, the total exit access travel distance shall not be limited.



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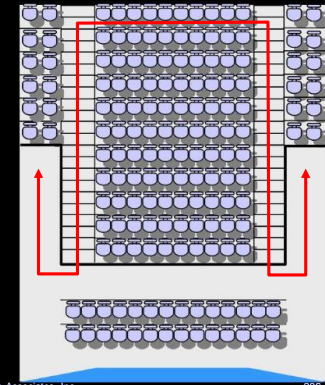
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Common Path Of Travel 1030.8

- The common path of egress travel shall not exceed 30 feet from any seat to a point where an occupant has a choice of two paths of egress travel to two exits.

Exceptions:

- For areas serving less than 50 occupants, the common path of egress travel shall not exceed 75 feet.
- For smoke-protected or open air assembly seating, the common path of egress travel shall not exceed 50 feet.



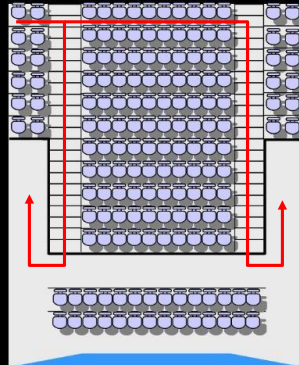
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Path Through Adjacent Row 1030.8.1

- Where one of the two paths of travel is across the aisle through a row of seats to another aisle, there shall be not more than 24 seats between the two aisles.
- Minimum clear width between rows shall be 12 inches plus 0.6 inch for each additional seat above seven in the row between aisles.
 - Exception:
 - Smoke-protected and open air assembly seating there shall be not more than 40 seats between the two aisles and the minimum clear width shall be 12 inches plus 0.3 inch for each additional seat.



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Assembly Aisles Are Required 1030.9

- Every occupied portion of any building, room or space used for assembly purposes that contains seats, tables, displays, similar fixtures or equipment shall be provided with aisles leading to exits or exit access doorways in accordance with this section.



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Minimum Aisle Width 1030.9.1

The minimum clear width of aisles shall comply with one of the following:

- 48" for stepped aisles having seating on each sides.
- Exception:
 - 36" where the stepped aisles serve less than 50 seats.
- 36" for stepped aisles having seating on only one side.
 - 23" between an aisle handrail and seating where the aisle doesn't serve more than 5 rows on one side.
- 23" between a stepped aisle handrail or guard and seating where the stepped aisle is subdivided by a mid-aisle handrail.

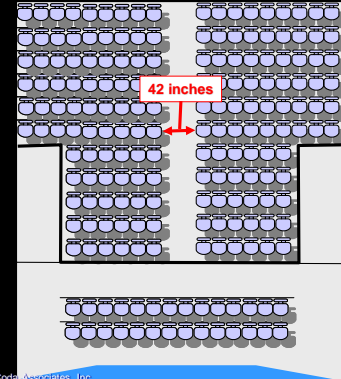


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Minimum Aisle Width 1030.9.1

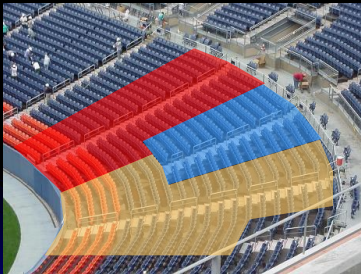
- 42" for level or ramped aisles having seating on both sides.
- Exceptions:
 - 36" where the aisle serves less than 50 seats.
 - 30" where the aisle does not serve less than 15 seats and does not serve as the accessible route.
- 36" for level or ramped aisles having seating on only one side.
- Exception:
 - For other than ramped aisles that serve as part of an accessible route, 30 inches (762 mm) where the ramped aisle does not serve more than 14 seats.



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Aisle Catchment Area 1030.9.2



- The aisle width shall provide sufficient egress capacity for the number of persons accommodated by the catchment area served by the aisle.
- The catchment area served by an aisle is that portion of the total space that is served by that section of the aisle.
- In establishing catchment areas, the assumption shall be made that there is a balanced use of all means of egress, with the number of persons in proportion to egress capacity.

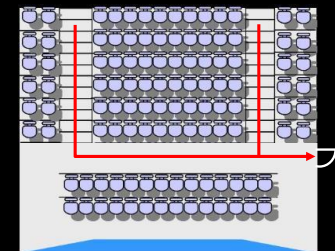
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Converging Aisles 1030.9.3

- Those portions of aisles, where egress is possible in either of two directions, shall be uniform in minimum width or required capacity.

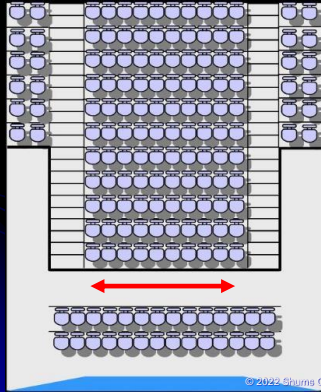


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Uniform Width 1030.9.4



- Those portions of aisles, where egress is possible in either of two directions, shall be uniform in minimum width or required capacity.

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1030.9.5 Dead end aisles

- Each end of an aisle shall be continuous to a cross aisle, foyer, doorway, vomitory, concourse or stairway in accordance with Section 1030.9.7 having access to an exit.
 - Exceptions:
 - Dead-end aisles shall be not greater than 20 feet in length.
 - Dead-end aisles longer than 16 rows are permitted where seats beyond the 16th row dead-end aisle are not more than 24 seats from another aisle, measured along a row of seats having a minimum clear width of 12 inches plus 0.6 inch for each additional seat above seven in the row where seats have backrests or beyond 10 where seats are without backrests in the row.
 - For smoke-protected and open-air assembly seating, the dead end aisle length of vertical aisles shall not exceed a distance of 21 rows.
 - For smoke-protected and open-air assembly seating, a longer dead-end aisle is permitted where seats beyond the 21-row dead-end aisle are not more than 40 seats from another aisle, measured along a row of seats having an aisle accessway with a minimum clear width of 12 inches plus 0.3 inch for each additional seat above seven in the row where seats have backrests or beyond 10 where seats are without backrests in the row.

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1030.9.6 Aisle measurement

- The clear width for aisles shall be measured to walls, edges of seating and tread edges except for permitted projections.
 - Exception: The clear width of aisles adjacent to seating at tables shall be measured in accordance with Section 1030.13.1.



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Assembly Aisle Obstructions 1030.9.6.1

- There shall be no obstructions in the required width of aisles except for handrails as provided in Section 1030.13.
 - Exception: Handrails are permitted to project into the required width of stepped aisles and ramped aisles in accordance with Section 1014.8.



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1030.9.7

Stairways connecting to stepped aisles

- A stairway that connects a stepped aisle to a cross aisle or concourse shall be permitted to comply with the assembly aisle walking surface requirements of Section 1030.14.
- Transitions between stairways and stepped aisles shall comply with Section 1030.10.



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1030.9.8

Stairways connecting to vomitories

- A stairway that connects a vomitory to a cross aisle or concourse shall be permitted to comply with the assembly aisle walking surface requirements of Section 1030.14.
- Transitions between stairways and stepped aisles shall comply with Section 1030.10.



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1030.10.1 Transitions

- Stepped aisles, transitions and stairways that maintain the stepped aisle riser and tread dimensions shall comply with Section 1030.14 as one exit access component.



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1030.10.2 Transitions

- Transitions between stairways and stepped aisles having different riser and tread dimensions shall comply with Sections 1030.10.2.1 through 1030.10.3.



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1030.10.2.1 Stairways and stepped aisles in a straight run

- Where stairways and stepped aisles are in a straight run, transitions shall have one of the following:
 1. A depth of not less than 22 inches where the treads on the descending side of the transition have greater depth.
 2. A depth of not less than 30 inches where the treads on the descending side of the transition have lesser depth.



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1030.10.2.2 Stairways that change direction from stepped aisles

- Transitions where the stairway changes direction from the stepped aisle shall have a minimum depth of 11 inches or the stepped aisle tread depth, whichever is greater, between the stepped aisle and stairway.



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1030.10.3 Transition marking

- A distinctive marking stripe shall be provided at each nosing or leading edge adjacent to the transition.
- Such stripe shall be not less than 1 inch and not more than 2 inches wide.
- The edge marking stripe shall be distinctively different from the stepped aisle contrasting marking stripe.



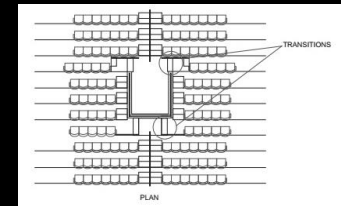
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1030.11.1 Stepped aisles that change direction at vomitories

- Stepped aisle treads where the stepped aisle changes direction at a vomitory shall have a depth of not less than 11 inches or the stepped aisle tread depth, whichever is greater.
- The height of a stepped aisle tread above a transition at a vomitory shall comply with Section 1030.14.2.2.



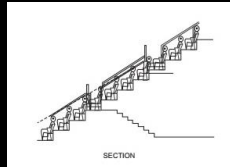
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1030.11.2 Stepped aisle transitions at the top of vomitories

- Transitions between the stepped aisle above a vomitory and stepped aisles to the side of a vomitory shall have a depth of not less than 11 inches or the stepped aisle tread depth, whichever is greater.



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1030.12 Construction

- Aisles, stepped aisles and ramped aisles shall be built of materials consistent with the types permitted for the type of construction of the building.
- Exception: Wood handrails shall be permitted for all types of construction.



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1030.12.1 Walking surface

- The surface of aisles, stepped aisles and ramped aisles shall be of slip-resistant materials that are securely attached. The surface for stepped aisles shall comply with Section 1011.7.1.



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1030.12.2 Outdoor conditions

- Outdoor aisles, stepped aisles and ramped aisles and outdoor approaches to aisles, stepped aisles and ramped aisles shall be designed so that water will not accumulate on the walking surface.



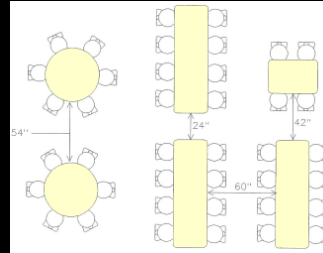
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1030.13.1 Seating at tables

- Where seating is located at a table or counter and is adjacent to an aisle or aisle accessway, the measurement of required clear width of the aisle or aisle accessway shall be made to a line 19 inches away from and parallel to the edge of the table or counter.
- The 19-inch distance shall be measured perpendicular to the side of the table or counter.
- In the case of other side boundaries for aisles or aisle accessways, the clear width shall be measured to walls, edges of seating and tread edges.



- Exception for fixed seating

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1030.13.1.1 - Aisle accessway capacity and width for seating at tables

- Aisle accessways serving arrangements of seating at tables or counters shall comply with the capacity requirements of Section 1005.1 but shall not have less than 12 inches of width plus 1/2 inch of width for each additional 1 foot, or fraction thereof, beyond 12 feet of aisle accessway length measured from the center of the seat farthest from an aisle.



- Exception: Portions of an aisle accessway having a length not exceeding 6 feet and used by a total of not more than four persons.

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1030.13.1.2 - Seating at table aisle accessway length

- The length of travel along the aisle accessway shall not exceed 30 feet from any seat to the point where a person has a choice of two or more paths of egress travel to separate exits.



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Clear Width Of Aisle Accessways Serving Seating - 1030.13.2

- Where seating rows have 14 or fewer seats, the minimum clear aisle accessway width shall not be less than 12 inches measured as the clear horizontal distance from the back of the row ahead and the nearest projection of the row behind.
- Where chairs have automatic or self-rising seats, the measurement shall be made with seats in the raised position.



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Clear Width Of Aisle Accessways Serving Seating - 1030.13.2

- Where any chair in the row does not have an automatic or self-rising seat, the measurements shall be made with the seat in the down position.
- For seats with folding tablet arms, row spacing shall be determined with the tablet arm in the used position.



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Dual Access 1030.13.2.1

- For rows of seating served by aisles or doorways at both ends, there shall not be more than 100 seats per row.



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Dual Access 1030.13.2.1



22 seats
 $8 \times 0.3 = 2.4" + 12" = 14.4"$

- The minimum clear width of 12 inches between rows shall be increased by 0.3 inch for every additional seat beyond 14 seats where seats have backrests or beyond 21 where seats are without backrests. The minimum clear width is not required to exceed 22 inches.
- Exception: For smoke-protected and open-air assembly seating, the row length limits for a 12-inch-wide aisle accessway, beyond which the aisle accessway minimum clear width shall be increased, are in Table 1030.12.2.1.

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Smoke Protected Aisles

NUMBER OF SEATS IN THE SMOKE-PROTECTED OR OPEN-AIR ASSEMBLY SEATING	MAXIMUM NUMBER OF SEATS PER ROW PERMITTED TO HAVE A MINIMUM 12-INCH CLEAR WIDTH AISLE ACCESSWAY			
	Aisle or doorway at both ends of row		Aisle or doorway at one end of row only	
	Seats with backrests	Seats without backrests	Seats with backrests	Seats without backrests
Less than 4,000	14	21	7	10
4,000 to 6,999	15	22	7	10
7,000 to 9,999	16	23	8	11
10,000 to 12,999	17	24	8	11
13,000 to 15,999	18	25	9	12
16,000 to 18,999	19	26	9	12
19,000 to 21,999	20	27	10	13
22,000 and greater	21	28	11	14

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Single Access 1030.13.2.2

- For rows of seating served by an aisle or doorway at only one end of the row, the minimum clear width of 12 inches between rows shall be increased by 0.6 inch for every additional seat beyond seven seats where seats have backrests or beyond 10 where seats are without backrests. The minimum clear width is not required to exceed 22 inches.
- Exception: For smoke-protected assembly seating, the row length limits for a 12-inch-wide aisle accessway, beyond which the aisle accessway minimum clear width shall be increased, are in Table 1030.13.2.1.



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Ramped aisles 1030.14.1

- Aisles that are sloped more than one unit vertical in 20 units horizontal (5-percent slope) shall be considered a ramped aisle.
- Ramped aisles that serve as part of an accessible route in accordance with Sections 1009 and 1108.2 shall have a maximum slope of one unit vertical in 12 units horizontal (8-percent slope).
- The slope of other ramped aisles shall not exceed one unit vertical in 8 units horizontal (12.5-percent slope).



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1030.14.1.1 Cross slope

- The slope measured perpendicular to the direction of travel of a ramped aisle shall not be steeper than one unit vertical in 48 units horizontal (2-percent slope).



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1030.14.1.2 Landings

- Ramped aisles shall have landings in accordance with Sections 1012.6 through 1012.6.5. Landings for ramped aisles shall be permitted to overlap required aisles or cross aisles.



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1030.14.1.3 Edge protection

- Ramped aisles shall have edge protection in accordance with Sections 1012.10 and 1012.10.1.
- Exception: In assembly spaces with fixed seating, edge protection is not required on the sides of ramped aisles where the ramped aisles provide access to the adjacent seating and aisle accessways.



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1030.14.2 Stepped aisles

- Aisles with a slope exceeding one unit vertical in eight units horizontal (12.5-percent slope) shall consist of a series of risers and treads that extends across the full width of aisles and complies with Sections 1030.14.2.1 through 1030.14.2.4.



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Treads 1030.14.2.1

- Tread depths shall be a minimum of 11 inches and shall have dimensional uniformity.
- Exception: The tolerance between adjacent treads shall not exceed 3/16 inch.



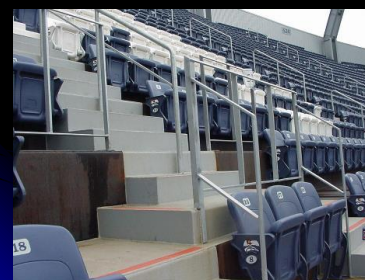
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Risers 1030.14.2.2

- Where the gradient of stepped aisles is to be the same as the gradient of adjoining seating areas, the riser height shall be not less than 4 inches nor more than 8 inches and shall be uniform within each flight.



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Risers 1030.13.2.2 - Exceptions

- Exceptions:
 1. Riser height nonuniformity shall be limited to the extent necessitated by changes in the gradient of the adjoining seating area to maintain adequate sightlines. Where nonuniformities exceed 0.188 inch between adjacent risers, the exact location of such nonuniformities shall be indicated with a distinctive marking stripe on each tread at the nosing or leading edge adjacent to the nonuniform risers. Such stripe shall be not less than 1 inch, and not more than 2 inches, wide. The edge marking stripe shall be distinctively different from the contrasting marking stripe.
 2. Riser heights not exceeding 9 inches shall be permitted where they are necessitated by the slope of the adjacent seating areas to maintain sightlines.

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1030.14.2.2.1 Construction tolerances

- The tolerance between adjacent risers on a stepped aisle that were designed to be equal height shall not exceed 3/16 inch



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1030.14.2.2.1 Construction tolerances

- Where the stepped aisle is designed in accordance with Exception 1 of Section 1030.14.2.2, the stepped aisle shall be constructed so that each riser of unequal height, determined in the direction of descent, is not more than 3/8 inch in height different from adjacent risers where stepped aisle treads are less than 22 inches in depth and 3/4 inch in height different from adjacent risers where stepped aisle treads are 22 inches or greater in depth.



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Tread Contrasting Marking Stripe 1030.14.2.3

- A contrasting marking stripe shall be provided on each tread at the nosing or leading edge such that the location of each tread is readily apparent when viewed in descent. Such stripe shall be a minimum of 1 inch, and a not more than 2 inches, wide.
 - Exception: The contrasting marking stripe is permitted to be omitted where tread surfaces are such that the location of each tread is readily apparent when viewed in descent.



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Seat Stability 1030.15

- In a building, room or space used for assembly purposes, the seats shall be securely fastened to the floor.
- Exceptions:
 1. In a building, room or space used for assembly purposes or portions thereof without ramped or tiered floors for seating and with 200 or fewer seats, the seats shall not be required to be fastened to the floor.



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Seat Stability 1030.15

2. In a building, room or space used for assembly purposes or portions thereof without ramped or tiered floors for seating, the seats shall not be required to be fastened to the floor.



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Seat Stability 1030.15

3. In a building, room or space used for assembly purposes or portions thereof without ramped or tiered floors for seating and with greater than 200 seats, the seats shall be fastened together in groups of not less than three or the seats shall be securely fastened to the floor.



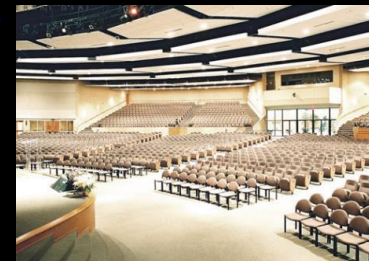
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Seat Stability 1030.15

4. In a building, room or space used for assembly purposes where flexibility of the seating arrangement is an integral part of the design and function of the space and seating is on tiered levels, not more than 200 seats shall not be required to be fastened to the floor. Plans showing seating, tiers and aisles shall be submitted for approval.



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Seat Stability 1030.15

5. Groups of seats within a building, room or space used for assembly purposes separated from other seating by railings, guards, partial height walls or similar barriers with level floors and having not more than 14 seats per group shall not be required to be fastened to the floor.



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Seat Stability 1030.15

6. Seats intended for musicians or other performers and separated by railings, guards, partial height walls or similar barriers shall not be required to be fastened to the floor.



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Handrails 1030.16

- Ramped aisles having a slope exceeding one unit vertical in 15 units horizontal (6.7% slope) and stepped aisles shall be provided with handrails in compliance with Section 1014 located either at one or both sides of the aisle or within the aisle width.



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Handrails 1030.16

- Where stepped aisles have seating on one side and the aisle width is 74 inches or greater, two handrails are required.
- Where two handrails are required, one of the handrails shall be within 30 inches horizontally of the stepped aisle.



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Handrails 1030.16

Exceptions:

1. Handrails are not required for ramped aisles with seating on both sides.
2. Handrails are not required where, at the side of the aisle, there is a guard with a top surface that complies with the graspability requirements of handrails in accordance with Section 1014.3.
3. Handrail extensions are not required at the top and bottom of stepped aisles and ramped aisles to permit crossovers within the aisles.



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Discontinuous handrails 1030.16.1

- Where there is seating on both sides of the aisle, the mid-aisle handrails shall be discontinuous. Where a stepped aisle is required to have two handrails, the mid-aisle handrails shall be discontinuous.
- Gaps or breaks shall be provided at intervals not exceeding five rows to facilitate access to seating and to permit crossing from one side of the aisle to the other.
- These gaps or breaks shall have a clear width of not less than 22 inches and not greater than 36 inches, measured horizontally, and the mid-aisle handrail shall have rounded terminations or bends.



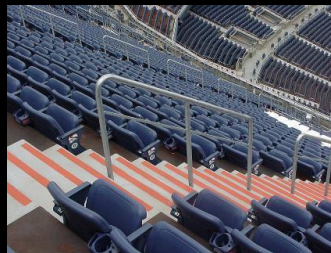
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Handrail Termination 1030.16.2

- Handrails located on the side of stepped aisles shall return to a wall, guard or the walking surface or shall be continuous to the handrail of an adjacent stepped aisle flight.



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1030.16.3 Mid-aisle termination

- Mid-aisle handrails shall not extend beyond the lowest riser and shall terminate within 18 inches, measured horizontally, from the lowest riser.
- Handrail extensions are not required.
- Exception: Mid-aisle handrails shall be permitted to extend beyond the lowest riser where the handrail extensions do not obstruct the width of the cross aisle.



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1030.16.4 Rails

- Where mid-aisle handrails are provided in stepped aisles, there shall be an additional rail located approximately 12 inches below the handrail.
- The rail shall be adequate in strength and attachment in accordance with Section 1607.8.1.2.



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Assembly guards 1030.17

- Guards adjacent to seating in a building, room or space used for assembly purposes shall be provided where required by Section 1015 and shall be constructed in accordance with Section 1015 except where provided in accordance with Sections 1030.17.1 through 1030.17.4.



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Assembly guards 1030.17

- At bleachers, grandstands and folding and telescopic seating, guards must be provided where required by ICC 300 and Section 1030.17.1.



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1030.17.1 Perimeter guards

- Perimeter guards shall be provided where the footboards or walking surface of seating facilities are more than 30 inches above the floor or grade below.
- Where the seatboards are adjacent to the perimeter, guard height shall be 42 inches high minimum, measured from the seatboard.



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1030.17.1 Perimeter guards

- Where the seats are self-rising, guard height shall be 42 inches high minimum, measured from the floor surface. Where there is an aisle between the seating and the perimeter, the guard height shall be measured in accordance with Section 1015.2.

- Exceptions:
 - Guards that impact sightlines shall be permitted to comply with Section 1030.17.3.
 - Bleachers, grandstands and folding and telescopic seating shall not be required to have perimeter guards where the seating is located adjacent to a wall and the space between the wall and the seating is less than 4 inches.



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Cross aisles 1030.17.2

- Cross aisles located more than 30 inches above the floor or grade below shall have guards in accordance with Section 1015.



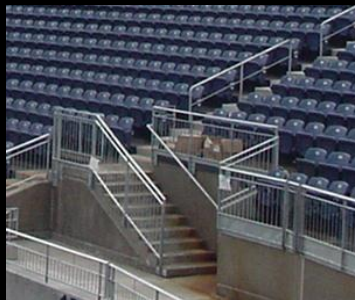
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Cross aisles 1030.17.1

- Where an elevation change of 30 inches or less occurs between a cross aisle and the adjacent floor or grade below, guards not less than 26 inches above the aisle floor shall be provided.
- Exception: Where the backs of seats on the front of the cross aisle project 24 inches or more above the adjacent floor of the aisle, a guard need not be provided.



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Sightline-Constrained Guard Heights 1030.17.3

- Unless subject to the requirements of Section 1030.17.4, a fascia or railing system in accordance with the guard requirements of Section 1015 and having a minimum height of 26 inches shall be provided where the floor or footboard elevation is more than 30 inches above the floor or grade below and the fascia or railing would otherwise interfere with the sightlines of immediately adjacent seating.

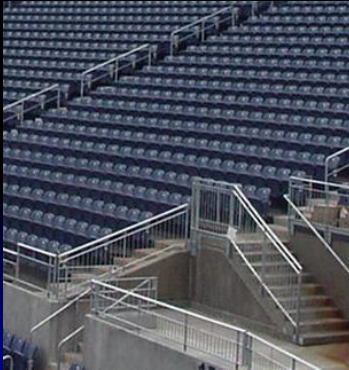


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Guards At The End Of Aisles 1030.17.4



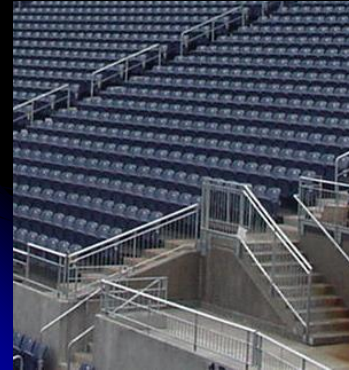
- A fascia or railing system complying with the guard requirements of Section 1015 shall be provided for the full width of the aisle where the foot of the aisle is more than 30 inches above the floor or grade below.

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Guards At The End Of Aisles 1030.17.4



- The fascia or railing shall be a minimum of 36 inches high and shall provide a minimum 42 inches measured diagonally between the top of the rail and the nosing of the nearest tread.

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Steve Thomas
Shums Coda Associates, Inc.

4610 S Ulster, Suite 150
Denver, CO 80237

Ph. 303-400-6564
Fax 303-693-0630

www.shumscoda.com
Bill.Clayton@shumscoda.com



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